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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/022,317	12/18/2001	William A. Wojteczak	451-Div	3248

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ATMI, INC.
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EXAMINER

CHEN, KIN CHAN

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 05/05/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 10/022,317	Applicant(s) WOJTCZAK ET AL.	
	Examiner Kin-Chan Chen	Art Unit 1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 April 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) _____ is/are pending in the application.
- 4a) Of the above claim(s) 1-33,38-45 and 50-56 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-33,38-45 and 50-56 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date: _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on April 22, 2004 has been entered.

Claim Rejections - 35 USC § 103

2. Claims 1-33, 38-45, and 50-56 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mravic et al. (Us 6,083,840; hereinafter "Mravic") in view of Kaufman et al. (US 6,063,306; hereinafter "Kaufman").

In a method for chemical mechanical polishing copper, barrier, and dielectric material, Mravic teaches that two-step polishing may be used. First polishing slurry may be used to polish copper. First polishing slurry may comprise silica particles and oxidizing agent and corrosion inhibitor and cleaning agent and respective composition as instantly claimed. Mravic does not disclose the removal rate of barrier material.

However, the first slurry has a copper removal rate similar to the claims. It is expected to have the so-called lower removal rate on the barrier in the absence of any evidence showing the contrary. The wafer surface may be chemical mechanical polished with the first slurry. A second chemical mechanical polishing slurry may be provided. Mravic teaches slurry comprises a fumed silica or colloidal, carboxylic acid (or dicarboxylic acid), an oxidizer, and other optional components. The first slurry has a pH within the claimed range and may be modified with ammonium hydroxide (col. 1, lines 19-23, col. 3 line 20 through col. 6, line 55, example 1, and claims 20-28).

Unlike the claimed invention, Mravic does not teach that the second slurry may has a higher removal rate on the barrier material and intermediate removal rate on copper. In a method for chemical mechanical polishing copper and barrier material, Kaufman teaches that two-step polishing may be used. First polishing slurry may be used to polish copper. The second slurry is able to selectively polishing the barrier with higher removal rate on barrier and intermediate removal rate on copper, see col. Col. 3, lines 27-31, and examples and Tables. The polishing slurry may comprise silica particles and oxidizing agent and corrosion inhibitor and cleaning agent and respective composition as instantly claimed (col. 9, 10 and examples). Hence, it would have been obvious to one with ordinary skilled in the art to use composition and method of Kaufman in Mravic because both are used for the same purpose (polishing copper and barrier) and **because Kaufman teaches that using their second slurry would provide higher polishing rate on barrier material (as compared with polishing rate on copper) in the second-step polish.** Kaufman is silent in the polishing rate of

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dielectric layer of the second slurry. However, it is expected to have "lower removal rate" in the absence of any evidence showing the contrary. The combined prior art also teaches particles size, fumed silica and colloidal silica, using barrier material such as tantalum, tantalum nitride in the instant dependent claims.

"It is prima facie obvious to combine two compositions each of which is taught by the prior art to be useful for the same purpose, in order to form a third composition which is to be used for the very same purpose."

In re Kerkhoven 205 USPQ 1069 (CCPA 1980). Cites *In re Susi* 169 USPQ 423, 426 (CCPA 1971); *In re Crockett* 126 USPQ 186, 188 (CCPA 1960). See also *Ex parte Quadranti* 25 USPQ 2d 1071 (BPAI 1992).

3. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kaufman et al. (US 6,063,306; hereinafter "Kaufman").

In a method for chemical mechanical polishing copper and barrier material, Kaufman teaches that two-step polishing may be used. First polishing slurry may be used to polish copper. The second slurry is able to selectively polishing the barrier with higher removal rate on barrier and intermediate removal rate on copper, see col. Col. 3, lines 27-31, and examples and Tables. The first or second polishing slurry may comprise silica particles and oxidizing agent and corrosion inhibitor and cleaning agent and respective composition as instantly claimed (col. 9, 10 and examples). Kaufman makes no mention of the polishing rate of barrier material in the first CMP slurry. However, it is expected to have "lower removal rate" in the absence of any evidence showing the contrary. Although Kaufman is silent about the polishing rate of the second slurry for the dielectric layer, it is expected to have "lower removal rate" in the absence

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of any evidence showing the contrary since there is no any numerical value for the removal rates is defined.

Response to Arguments

4. Applicant's arguments filed on April 22, 2004 and February 17, 2004 have been fully considered but they are not persuasive.

Applicant has argued that the Mravic teaches that **the second slurry** containing 15-30% abrasive and a pH range of 9-11 and polishing copper , tantalum, and dielectric at about equal polishing rates. It is not persuasive. Kaufman teaches the limitation of the second slurry of the claimed invention. As has been stated in the office action, it would have been obvious to one with ordinary skilled in the art to use composition and method of Kaufman in Mravic because both are used for the same purpose (polishing copper and barrier) and because Kaufman teaches that using their second slurry would provide higher polishing rate on barrier material **(as compared with polishing rate on copper)** in the second step polishing.

One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. In re Merk &Co., Inc., 800F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). (our ref. Only ..MPEP 2145 IV.)

Applicant has argued that Kaufman's second slurry actually yields lower polishing rate on barrier layer as compared with that of Mravic. It is not persuasive. Since the polishing conditions (such as downforce, table speed, spindle speed ..etc.,) are very different for Kaufman and Mravic. The comparison cannot be realized. As has been

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stated in the office action, **Kaufman teaches that using their second slurry would provide higher polishing rate on barrier material (as compared with polishing rate on copper) in the second-step polish.**

Applicant has argued that Kaufman discloses the oxidizing agent / corrosion inhibitor weight ratio approaches 25:1 and complexing agent may include corrosion inhibitor such as in col. 8, lines 21-26. In fact, the complexing agent including a list of materials in Kaufman (col. 8, lines 11-15) and **corrosion inhibitor could be in the list of so-called forming agent in Kaufman (col. 8, lines 34-39). Furthermore, corrosion inhibitor is only added if needed.** Applicant argues that in instant specification states that the corrosion inhibitors for the first and second slurries should be a carboxylic acid (e.g., IDA), and acetic acid (in Kaufman's complexing agent list) is carboxylic acid. In fact, Carboxylic acid is a generic name which includes hundreds of thousands of materials. Only handful carboxylic acids can be used for corrosion inhibitors, and acetic acid does not appear to be one of them. **Corrosion inhibitor in Kaufman is actually in the list of so-called forming agent in col. 8, lines 34-39.** In addition, **in** the instant claims, applicant recites that iminodiacetic acid (IDA) is in a range of 0-2%, therefore, **0% of iminodiacetic acid (IDA) may be used in the composition.** Furthermore, Kaufman's disclosure is not limited to a specific exemplified (materials). See *In re Fracalossi*, 681 F.2d 792, 794 n.1, 215 USPQ 569, 570 n.1 (CCPA 1982).

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5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kin-Chan Chen whose telephone number is (571) 272-1461. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on (571) 272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

May 3, 2004



Kin-Chan Chen
Primary Examiner
Art Unit 1765

K-C C